PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference PCT149	FOR FURTHER ACTION	See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)
International application No. PCT/IT 03/00604	International filing date *(day/month/year)* 08.10.2003	Priority date *(day/month/year)* 08.10.2003
International Patent Classification (IPC) or both national classification and IPC F16D3/18		
Applicant GASPARDO SEMINATRICI S.P.A. et al.		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 5 sheets, including this cover sheet.

   ☒ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

   These annexes consist of a total of 4 sheets.

3. This report contains indications relating to the following items:

   - I ☒ Basis of the opinion
   - II ☐ Priority
   - III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
   - IV ☐ Lack of unity of invention
   - V ☒ Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
   - VI ☐ Certain documents cited
   - VII ☐ Certain defects in the international application
   - VIII ☐ Certain observations on the international application

Date of submission of the demand	Date of completion of this report
21.04.2005	08.09.2005
Name and mailing address of the international preliminary examining authority: European Patent Office - P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk - Pays Bas Tel. +31 70 340 - 2040 Tx: 31 651 epo nl Fax: +31 70 340 - 3016	Authorized Officer J. Giráldez Sánchez Telephone No. +31 70 340-3488

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/IT 03/00604

I. Basis of the report

1. With regard to the **elements** of the international application *(Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17))*:

Description, Pages

1-8 as originally filed

Claims, Numbers

1-12 filed with telefax on 31.08.2005

Drawings, Sheets

1/2, 2/2 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
- ☐ the claims, Nos.:
- ☐ the drawings, sheets:

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)).

   (Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	1-12
	No:	Claims	
Inventive step (IS)	Yes:	Claims	1-12
	No:	Claims	
Industrial applicability (IA)	Yes:	Claims	1-12
	No:	Claims	

2. Citations and explanations

   see separate sheet

Re Item V

Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

Reference is made to the following documents:

D1: WO 99/66224 A (HERRMANN WERNER) 23 December 1999 (1999-12-23)

The document D1 is regarded as being the closest prior art to the subject-matter of claim 1, and shows (the references in parentheses applying to this document):

A transmission joint for transmitting drive between a first shaft (10) and a second shaft (3), comprising a first joint element (9) and a second joint element (2) which can be mutually coupled for the transmission of the drive between the shafts (3,10), each element being rotatable about a respective first or second axis of rotation, the first joint element (9) comprising an approximately spheroidal body formed by a plurality of adjacent segment-like portions (22) having curved external profile surfaces and defining, transverse the first axis, cross-sections of the body with polygonal outlines, the spheroidal body being able to engage a blind axial cavity (8) of the second joint element (2) having a cross-section, transverse the second axis, with a polygonal outline corresponding to the profile of the body and of dimensions such that the first joint element (9) is housed in the second joint element (2) with mutual torsional coupling and a capability for relative inclination of the axes of the joint elements (2,9) for the transmission of drive between the said shafts (3,10) with non-aligned axes, and it comprises on the joint elements (2,9), means (33,38,49) for limiting the relative angular inclination of the axes of rotation of the joint elements (2,9), in order consequently to permit the correct transmission of drive between inclined shafts, up to a preselected maximum angular inclination.

The subject-matter of claim 1 differs from this known transmission joint in that the first and second joint elements comprise a first portion and a second portion (9, 11) which are shaped as spherical sectors forming parts of a common spherical profile of preselected radius, a shell element with a spherical internal surface being provided for containing the spherical-sector-shaped portions and restraining them with relative coupling of the ball-and-socket type, with a common centre of rotation between the shell and the spherical sectors.

The subject-matter of claim 1 is therefore new (Article 33(2) PCT).

The problem to be solved by the present invention may be regarded as to restrain the movement of the two joint-elements avoiding axial displacements and allowing only the movements with a common centre of rotation.

The solution to this problem proposed in claim 1 of the present application is considered as involving an inventive step (Article 33(3) PCT) for the following reasons:

The concept described in claim 1 is neither known from the cited prior art, nor obvious.

Claims 2-12 are dependent on claim 1 and as such also meet the requirements of the PCT with respect to novelty and inventive step.

CLAIMS

1. A transmission joint for transmitting drive between a first shaft and a second shaft (2, 3), comprising a first joint element and a second joint element (4, 5) which can be mutually coupled for the transmission of the drive between the shafts, each element (4, 5) being rotatable about a respective first or second axis of rotation (X1, X2), the first joint element (4) comprising an approximately spheroidal body (6) formed by a plurality of adjacent segment-like portions (6a) having curved external profile surfaces and defining, transverse the first axis (X1), cross-sections of the body with polygonal outlines, the spheroidal body (6) being able to engage a blind axial cavity (10) of the second joint element (5) having a cross-section, transverse the second axis (X2), with a polygonal outline corresponding to the profile of the body (6) and of dimensions such that the first joint element (4) is housed in the second joint element (5) with mutual torsional coupling and a capability for relative inclination of the axes of the joint elements for the transmission of drive between the said shafts (2, 3) with non-aligned axes, the transmission joint further comprising, on the joint elements (4, 5), means for limiting the relative angular inclination of the axes (X1, X2) of rotation of the joint elements, in order consequently to permit the correct transmission of drive between inclined shafts (2, 3), up to a preselected maximum angular inclination (A), characterized in that the first and second joint elements (4, 5) comprise a first portion and a second portion (9, 11) which are shaped as spherical sectors (9a, 11a) forming parts of a common spherical profile of preselected radius, a shell element (14) with a spherical internal surface

being provided for containing the spherical-sector-shaped portions (9a, 11a) and restraining them with relative coupling of the ball-and-socket type, with a common centre of rotation between the shell (14) and the spherical sectors (9a, 11a).

2. A joint according to Claim 1 in which the limiting means comprise at least a first surface and a second surface (12, 13) defined on the first and second joint elements (4, 5), respectively, the surfaces (12, 13) being capable of contacting and bearing against one another at the preselected maximum inclination (A) between the axes (X1, X2) the joint elements (4, 5).

3. A joint according to Claim 1 or Claim 2 in which the surfaces (12, 13) are selected with profiles such that, at the maximum inclination (A) between the shafts, they are in mutual contact, tangentially relative to one another, during the transmission of drive between the elements of the joint (4, 5).

4. A joint according to Claim 3 in which one (12) of the surfaces has a flat configuration extending transverse the axis of rotation of the corresponding joint element (4) and the other (13) of the surfaces has a tapered configuration with generatrices that are inclined to a plane perpendicular to the axis of rotation of the corresponding joint element (5) at an angle equal to the selected maximum inclination (A) between the axes of the joint.

5. A joint according to any one of Claims 2 to 4 in which the surfaces (12, 13) are of substantially annular extent and are arranged in positions facing one another for mutual superimposition at the preselected

maximum inclination (A) between the axes (X1, X2) of the joint elements (4, 5).

6. A joint according to one or more of the preceding claims in which the shell (14) is made in at least two parts (14a, 14b) of predominantly hemispherical shape.

7. A joint according to any one of Claims 2 to 6 in which the body (6) extends coaxially as an extension of the first portion (9) and the first surface (12) constitutes a shoulder between the first spherical-sector-shaped portion (9) and the body (6).

8. A joint according to Claim 7 in which the first shoulder surface (12) constitutes at least partially a base of the spherical sector (9a) forming the first portion (9).

9. A joint according to one or more of the claims 1 to 5 in which the body (6) and the corresponding spherical-sector-shaped portion (9a, 9) of the first joint element (4) are produced as a unitary part.

10. A joint according to one or more of the claims 1 to 5 in which the cavity (10) is formed coaxially in the second portion (11) of the corresponding joint element (5), the second surface (13) extending around the cavity (10) so as to adjoin the spherical region of the second portion (11).

11. A joint according to Claim 10 in which the cavity (10) and the corresponding spherical-sector shaped portion (11a, 11) of the second joint element (5) are produced as a unitary part.

12. A joint according to one or more f the claims 1 to 5 in which the shell (14) has openings (17) in the region of the axes of rotation (X1, X2)

of the joint elements (4, 5) for the insertion of respective axial ends (18, 19) of the joint elements (4, 5) which are arranged for connection to the corresponding drive-transmission shafts (2, 3), the openings (17) being of an extent such as to permit relative inclination between the joint elements (4, 5), up to the preselected maximum inclination (A).